

COAL MINING

June, 1955

UNIVERSITY MICROFILMS
313 N 1st ST.
ANN ARBOR, MICH. 3

Volume ³²31, No. 6



Allis-Chalmers HD-15C tractor with torque converter handles "1,000 and one" big and little jobs.

*Lima Shovels
and
Allis-Chalmers
Tractors
boost
production for
Ralph Veon*

3 Limas keep production rolling.



Ralph Veon is one of many leading operators who depend on equipment from Highway to speed stripping and cut production costs. Photos show typical operations at Mr. Veon's mine, Darlington, Pa.

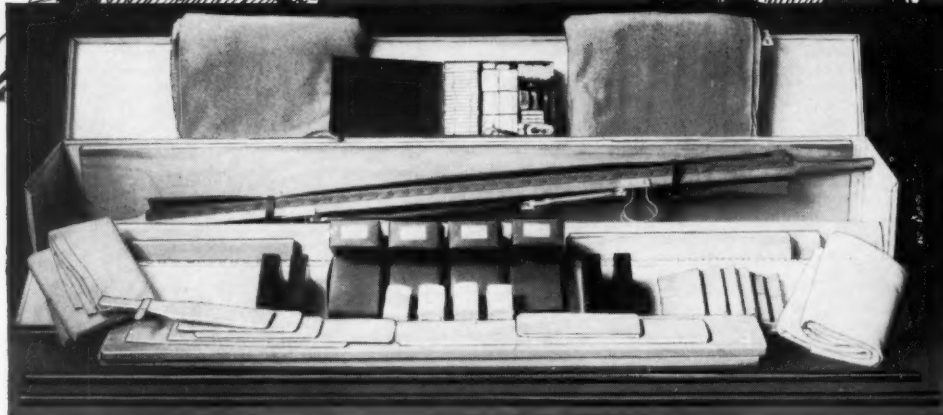
Allis-Chalmers • International Vibro-Tampers • Jaeger
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CONTENTS

- 1 Army-Type Stretcher
- 2 Pieces Canvas 6' x 8'
- 2 Single Wool Blankets
- 6 1 yd. Packages Picric Gauze
- 6 1 yd. Packages Sterile Gauze
- 1 1 oz. btl. Aromatic Spirits of Ammonia
- 1 Horn Spoon
- 6 Paper Drinking Cups
- 1 Metal Box for dressings
- 1 Set of 15 Wood Splints
- 1 Pair 4" bandage Scissors
- 2 Army-Type Tourniquets
- 48 40" Triangular Bandages, unsterilized
- 12 1" Compress Bandages, unsterilized
- 12 2" Compress Bandages, unsterilized
- 18 4" Compress Bandages, unsterilized
- 2 7' lengths $\frac{3}{4}$ " Pipe for improvised stretcher
- 4 Wood Blocks for heat applications
- 6 U. S. Bureau of Mines First Aid Manuals
- 2 Padlocks
- 1 Strong Steel Box, as illustrated

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McCarthy Coal Recovery Drill, Model 1436-42, with 36" diameter augers 12' long as used by Excavators, Inc., Sommerville, W. Va.

Robert B. Cleghorn, Jr., Hodgeville, West Virginia, reports his hydraulic, self-moving 42" McCarthy Coal Recovery Drill (shown below) mines "up to 500 tons of clean, low-cost quality coal per day." Cleghorn has a three-man crew—operates in pits as narrow as 34 feet. Operator has total vision, including the highwall. Model 12 handles 24' augers from 16" to 48" in diameter.

Hydraulically operated equipment on McCarthy Drills includes: jacks for levelling auger drill, auger guide, auger hoist, moving jacks and skids, and auger feed.



McCarthy Coal Recovery Drill, Model 1242-36, using 42" diameter augers 12' long.

McCarthy
Auger
Drills
Lower
Mining
Costs

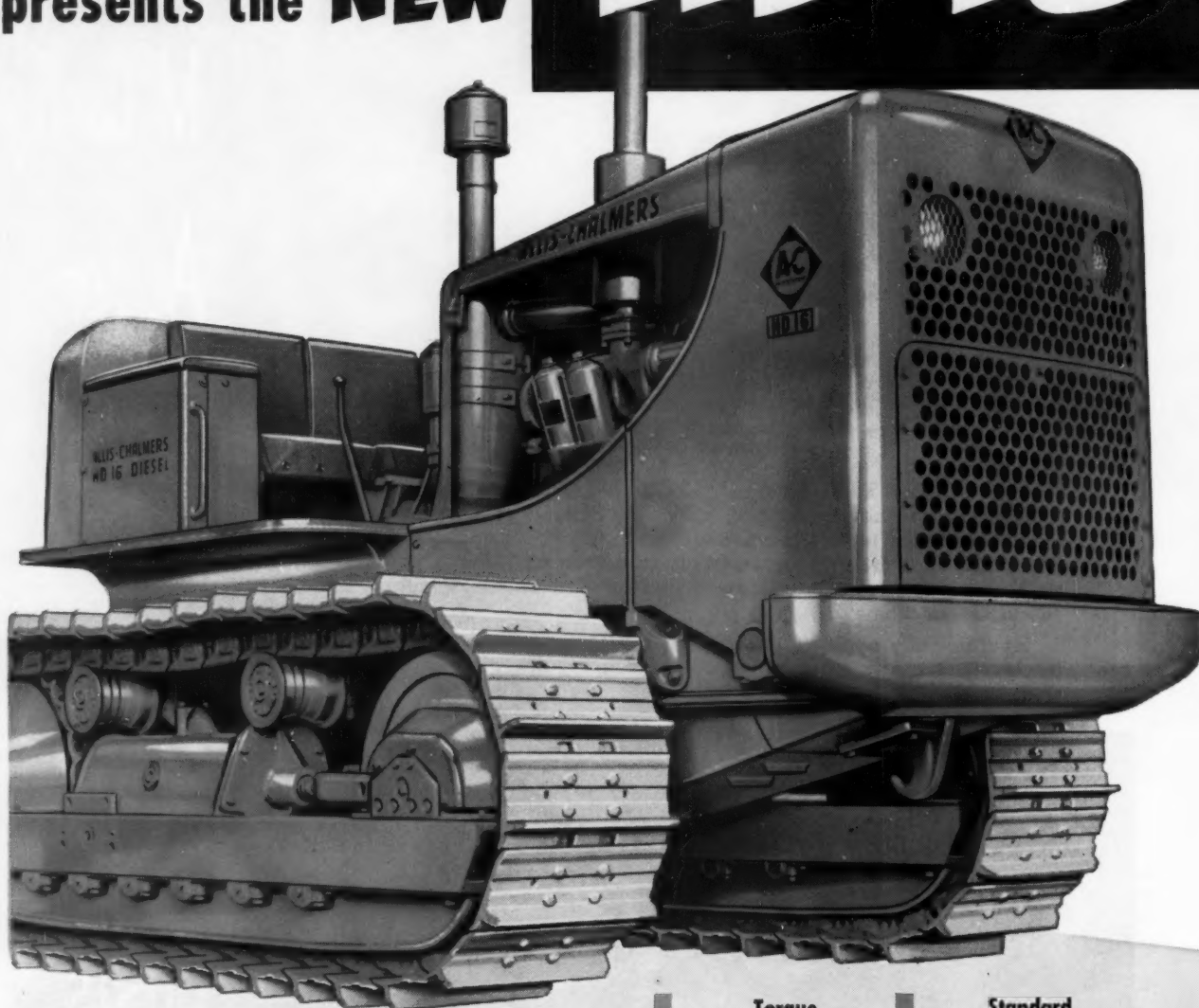


THE SALEM TOOL COMPANY
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Published monthly by Besset Press & Mailing Company, Publication Office - Besset Press & Mailing Co., 177 McKee Place, Pittsburgh 13, Pa. Executive Publisher F. F. JAMES, 4875 Country Club Drive, Pittsburgh, Pa. Price: in the United States, \$2.00; all other countries \$5.00. Single copy 50 cents. SECOND CLASS mail privileges authorized at Pittsburgh, Pennsylvania.

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presents the **NEW**

HD-16



***Your choice of two
outstanding drives***

	Torque Converter Drive	Standard Transmission Drive
Horsepower	150 net engine hp	131 belt hp
Weight	31,600 lb	31,500 lb
Drawbar pull	up to 60,000 lb*	up to 35,945 lb*

*Limited, under normal tractive conditions, to 90 percent of total weight of tractor and mounted equipment.

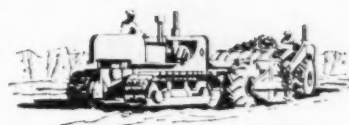
ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



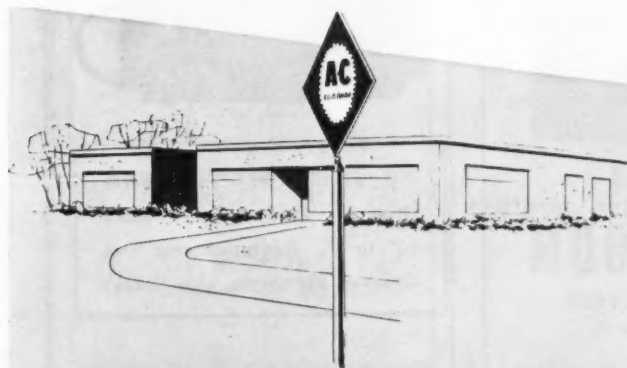
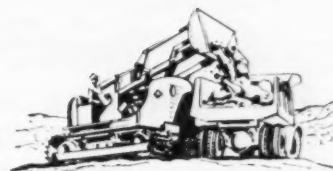
for a wide range of heavy-duty work

Set your sights on an HD-16! This big new tractor not only brings you *more* power for bigger jobs . . . it makes more effective use of horsepower, with a brand new Allis-Chalmers diesel engine and your choice of two new drives — the job-proved torque converter or the easy-shift standard transmission. Either way, the HD-16 brings you a new high in tractor-operator efficiency . . . a new high in work done under even the toughest conditions.



under all conditions!

The HD-16 follows the Allis-Chalmers *advanced basic design*, with such important features as its all-steel, Box-A main frame and one-piece steering clutch and final drive case . . . straddle-mounted final-drive gears with tapered roller bearings . . . unit construction . . . simplified lubrication and service designed with *better* maintenance in mind. What's more, it is newly engineered throughout to provide big safety factors in all components . . . plus outstanding new features like the new Allis-Chalmers heavy-duty diesel engine, new "wrap-around" radiator guard, husky new transmissions, new true-dimension track, and many others.



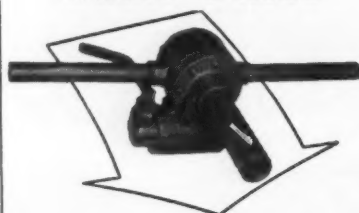
All in all, the new Allis-Chalmers HD-16 brings you an outstanding combination of performance and long life with both mounted and drawn equipment . . . a higher rate of production, more working time, more work done, **LOWERED JOB COSTS**. You OWE it to yourself to get all the facts now from your nearby Allis-Chalmers dealer.

Faster, Safer DRILLING



with the

SCHROEDER MODEL 12-B COAL DRILL



*Light-Weight!
Hydraulic!*

The Model 12-B Coal Drill gives you safe, dependable fast drilling with complete operational safety . . . no spark, no kick . . . all electrical hazards are removed yards from the drill. Powered from the hydraulic power systems of standard mining equipment, the Model 12-B is simple in design. It has a minimum of operating parts resulting in greatly reduced maintenance costs.

Write or call for details and demonstration.

Hydraulic Power Units are available for several non-hydraulic mining units. Wheel or skid mounted power units can also be furnished. Write or call for particulars!

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EXPRESS 1-1571

Recent improvements in Caterpillar Tractor Co.'s expanding line of earthmoving machinery have just been released. Large idler groups, which are now offered as attachments for the D4 Tractor, will be changed to the fabricated disc-type. The groups will continue to be offered as attachments.

The fabricated idlers are wider than the cast idlers and have hardened rims to give longer service life. Tangling of branches, mud packing, etc., is avoided with the elimination of spokes. This improvement has been added at no increase in price of the

attachment.

The standard D4 Tractor will include the smaller idler groups of the spoke-type. Special D4 arrangements which include the large idler groups will be changed to include the large idler groups of the disc-type. There will be no increase in price.

Larger, rigid-type push blocks are now included in the company's No. 70 Scraper and No. 15 Scraper at no increase in price. The larger pushing surface will provide a greater contact area for the pusher bulldozer blade—adding further protection to the scraper tires and ejector system.

SCOTTDAL MACHINE, FOUNDRY & CONSTRUCTION CO.

DEPT. CM

BOX 51

SCOTSDALE, PA.

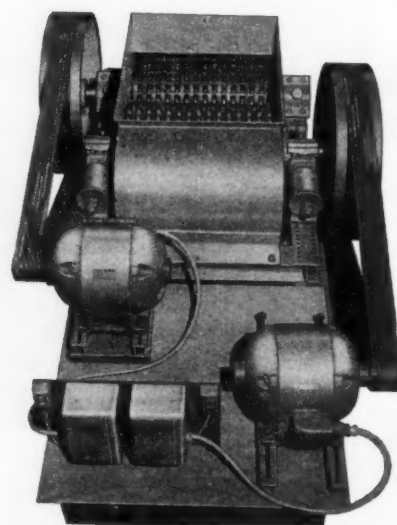
DOUBLE ROLL

COAL CRUSHER

**EFFICIENT . . . produces
a more uniform product!**

**ECONOMICAL . . . uses
less power!**

BOOSTS . . . sales—profits!



**NO. 63 SPECIAL — 2 Motor
Drive — Produces a Product
¾" to 8". Equipped with Two
Grooved Flywheels. (No Gears)**

Efficient and practical the shredding action of the crusher's tooth studded double rolls turns out a more consistent product. Quality produced forged steel tooth gears, welded steel base, bronze bushed journal bearings, welded steel hopper and grooved flywheels.

COAL MINING

XXXII
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Drills holes faster—Will not snap off shank or chip points—Outlasts four or five ordinary augers.

THE SALEM TOOL COMPANY

SALEM, OHIO, U.S.A.

Do You Know?

• Automatic foreman and inspectors, more accurate than humans, may direct the factories of the future.

Equipped with electronic "brains," they could calculate and request the correct number of specific sized parts from the automatic assembly line and reject those that do not meet specifications.

They would adjust the tooling machines when the parts are not right, segregate rejects, and stop the faulty machine or process when there are too many off-size parts. They could also calculate the production volume and mark the size classification on parts for later matching. A. Wiseman of the Sheffield Corporation, Dayton, Ohio,

The method was developed by Lieut. Col. Joel N. McNair and Col. J. H. King, Jr., of Walter Reed Medical Center, Washington, D. C.

• Hypnotism can be used to speed recovery of severely burned patients, a five-man team of psychiatrists and surgeons at the University of Texas Southwestern Medical School, Dallas, reported to the Journal of the American Medical Association.

Patients who were slowly starving because they had lost all appetite ate voraciously, consuming up to 8,250 calories a day, after hypnotic suggestion that they would be hungry and crave food. They even selected the particular foods that doctors consider most important for aiding recovery from burns, though in some cases they had disliked the foods even before they were burned.

Instead of begging for drugs to relieve pain, they were able to stand skin grafting operations without anesthetics while under hypnosis.

They felt better, exercised fingers and hands to help prevent crippling contractures, and began getting out of bed and doing things for themselves.

As a result, apparently of the increased food consumption, skin grafts took and the burns healed better.

One patient, bedridden for 18 months and going downhill, was discharged from the hospital walking and with nearly all his wounds healed 12 weeks after hypnosis was started.

While some patients are not amenable to hypnosis, there would be few such, the doctors think, among burned patients. They are so miserable and in such pain that they are ready to co-operate in the experiment that offers relief from their suffering and may speed their recovery.

The time involved in the hypnotic treatment is not great and resident and attending surgeons and resident anesthesiologists can quickly learn the techniques so as to reinforce the hypnosis daily.

The good results with this method of helping burned patients are reported by Drs. Harold B. Crasilneck, Jerry A. Stirman, Ben J. Wilson, Erasmus J. McCranie and Morris J. Fogelman.

• The total radioactive debris from all A- and H-Bomb explosions between 1951 and Jan. 1, 1955, falling out on the United States is low when compared to the radioactivity normally present in the earth's crust, two Atomic Energy Commission scientists reported.

The average value of the accumulated fall-out is 61 millicuries per square mile, Drs. Merrill Eisenbur and John H. Harley state. It varies from a figure of 21 in Arizona to 120 in New Mexico.

They compare this total for artificial radioactivity added to the atmosphere to that contributed by the naturally occurring radium 266, which varies from 100 to 1,000 millicuries per square mile.

A millicurie is one-thousandth of a currie, the unit by which radioactivity is measured, and equals 37,000,000 atomic disintegrations per second.

Drs. Eisenbur and Harley also report that the amount of radioactive strontium from fall-out is "minute" compared with radioactivity usually present in the earth's surface.

Strontium 90 is of particular interest because, being chemically similar to calcium, it may be deposited in human bone. Its half-life, the time required for its radioactivity to drop to one-half of the original value, is 25 years.

• Eye banks will give better service in future, thanks to a vacuum pack storage method announced by two Army doctors in the American Medical Association's Archives of Ophthalmology.

The method is for storing pieces of cornea, which is the clear covering over the iris and pupil of the eye. When the cornea has been damaged by disease or accident, eyesight can be restored, if the eye is otherwise unharmed, by a transplant of undamaged cornea.

By the new method, the corneas are dehydrated and vacuum packed in glycerine and stored at room temperature. Entire corneas from cat's eyes have been preserved by this method as long as four months. When taken out of storage and transplanted, they have remained clear for as long as 10 months. In some cases it was hard to tell the normal eye from the repaired one.

Here and There in the Coal Industry

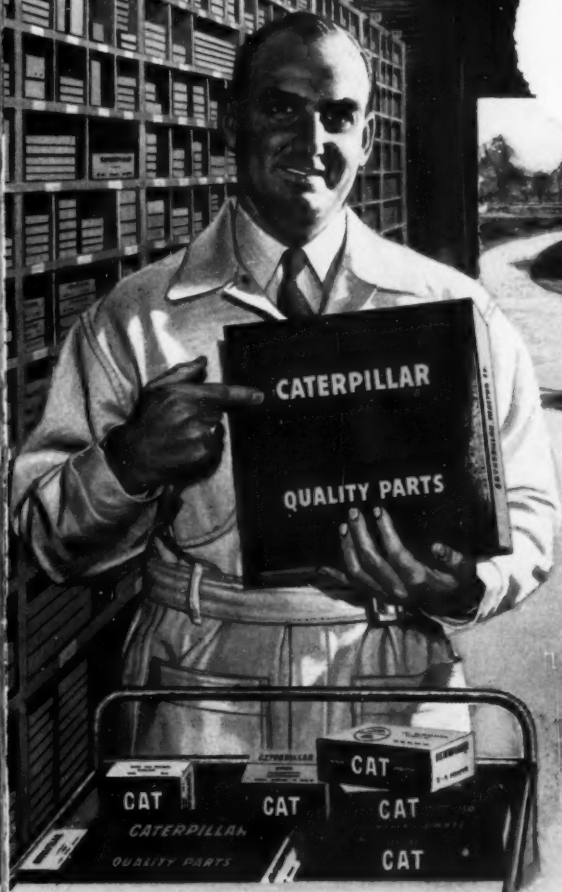
• FRED B. BULLARD, new executive secretary Hazard Coal Operators' Assn. Mr. Bullard, publisher of the Hazard (Ky.) *Herald* and operator of radio station WKIC, became executive secretary of the Hazard Coal Operators' Assn. on May 1. Accepting the new position, Mr. Bullard has agreed to relinquish all active participation in operations of both the newspaper and radio station. Expressing regret at leaving the newspaper business, Mr. Bullard said that "on the other hand, I am appreciative of the confidence the operators have indicated in offering me this important position."

Prior to entering the Navy in 1943, Mr. Bullard was for eight years an executive with the Columbus Mining Company at Allais. Mr. Bullard succeeds William B. Sturgill, who resigned last February to become executive vice president of the Columbus Mining Sales Company.

• FRED HALL has been named Assistant to the Chief Engineer of The Elk Horn Coal Corp., Wayland, Ky. Mr. Hall has been with the company for 13 years. His new duties will cover company properties of six eastern Kentucky counties and two northern West Virginia counties.

• CAROL IRENE HAWKINS, 17 years of age, from the South Charleston High School, South Charleston, W. Va., was one of the two second prize winners at the Sixth National Science Fair held at Cleveland, Ohio in May. Her subject was Coal Microscopy, a new tool for coal research. Miss Hawkins was the first to win an honor in these affairs from the coal industry region.

WHEN MINUTES MEAN MONEY
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Safeguard performance... insure your profits...

There's no "magic formula" for Caterpillar long life. It is built into each Cat product by hard work and painstaking care. An example of this care is shown here. Threads are small but vitally important parts of every machine built. Particularly in units which must take the pounding and strains of construction. To assure accuracy they are constantly checked by thread plug gauges. Each of these gauges is regularly inspected by precise instruments such as this optical measuring machine. Care such as this is typical of the steps taken at Caterpillar to assure you of equipment and parts that will work profitably.

THE CAT DW21 TRACTOR

Here's 2-wheel, rubber-tired tractor power at its best. 225 HP flowing through an efficient power train to big, balanced drive wheels. There's more than 11 HP for each yard of heaped scraper capacity—reserve power for big loads or for walking through mud and muck. Interchangeable scrapers, wagons and trailers are matched to the power and speed of the DW21. For a high-speed, 2-wheel tractor, let us show you why the Caterpillar DW21 is your investment for profits!



THE CAT DW20 TRACTOR

Let us demonstrate the power and speed of this 4-wheel, rubber-tired rig. Watch how quickly the big 225 HP engine gets you into high gear. See how smoothly the DW20 rides at its 34 MPH top speed... how it takes adverse grades with less shifting. Ask the operators how they boost yardage... with the easy-operating, two-plate clutch, a new clutch brake, the time-saving constant-mesh transmission and hydraulic booster steering. You'll be glad you saw and compared the Cat DW20.



THE CAT DW15 TRACTOR

And now, the newest in the Caterpillar family of rubber-tired prime movers—the DW15. It combines every proved feature of the DW20 with every part designed to deliver the full work power of its 150 HP Cat Diesel Engine. Matched scrapers and wagons add to job usefulness and profit opportunities.

This complete line of tractor power—tracks or rubber, is offered by your Caterpillar Dealer. Behind every Caterpillar product is careful, accurate manufacture for extra profits and years of equipment life.



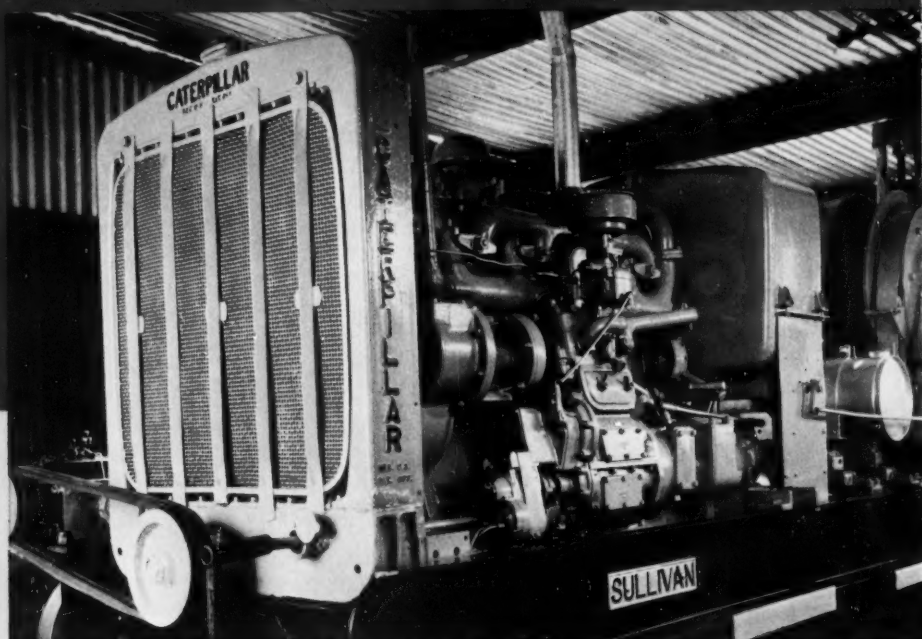
LOOK TO THE DEALER — **CATERPILLAR** — BEHIND THE PRODUCT



NO MATTER HOW OLD THE EQUIPMENT...

DEPENDABLE **CAT** PARTS

ARE *always* AVAILABLE!



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Parts may "look alike"—but don't let looks fool you. Only Caterpillar parts give you Caterpillar performance. Let us show you examples of careful manufacture and of savings that are yours when you replace with genuine Caterpillar parts. Call your nearby Caterpillar Dealer—listed below.

It's a fact! There never has been a "parts-orphan" in the Caterpillar line! Today, there are more Caterpillar-built products at work than all similar makes combined—AND—every owner is certain to get needed parts from his Caterpillar Dealer. No machine that carries the Caterpillar

trademark is ever a "parts-orphan." As your Caterpillar Dealer, we offer a complete parts service. New, low prices are now in effect on many parts. Bins were never better stocked. Let us prove why it will pay you to *standardize* on Caterpillar parts all the way—all the time!

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Torque Coupling

The Techniflex Corporation of Port Jervis, New York announces the release of its newly designed Torque Limiting Coupling, which is a mechanical device for controlling and fixing the maximum torque transmitted from a driver to a driven machine. Up to the limit to which it is adjusted, the Torque Coupling behaves like a conventional flexible coupling. Beyond this adjusted limit, the coupling permits a free wheeling or slip effect between the driving and driven halves of the coupling.

Two important functional properties claimed with the developed free-wheeling or slip effect are (a) the ability to use the de-coupling action in tripping a safety or emergency switch, (b) the ability to apply the repetitive detent action on which the slip effect is based towards a repetitive "hammer-blow" effect, and (c) its ability to work as a bi-directional torque coupling with independent torque rating for each direction if required. Couplings are available in standard nominal rating from 24 inch-lbs. to 100,000 inch-lbs. All couplings are readily adjustable from 50% to 150% of their nominal ratings.

Additional detailed data available on request.

Uses and properties—

The Techniflex Slip Coupling is a mechanical device for controlling and fixing the maximum torque which is transmitted from a driver to a driven machine. Up to the limit to which it is adjusted, the Slip Coupling behaves like a conventional flexible coupling, except that it permits a greater angular misalignment between the coupled shafts. Beyond this adjustable limit, the Slip Coupling

permits a free wheeling or slip effect between the driving and driven halves of the coupling.

Two important functional properties are associated with the developed free wheeling or slip effect:—(a) the ability to use the de-coupling action in tripping a safety or emergency switch; and (b) the ability to apply the repetitive detent action on which the slip effect is based towards a repetitive "hammer-blow" effect. The utility of the switch-tripping is of course, straightforward, and it is of great value in protecting mechanisms which are subject to overloading or driving into a "stop." As regards the repetitive "hammer-blow" effect, its importance lies in mechanisms which develop spotty wedging or frictive effects. In such instances, when it is of value to "hammer" the mechanism past the "wedge-spot" in order to reach the mechanism's free-running zone, the Slip Coupling does this without introducing "backlash" or lag effects. Towards accomplishing this purpose, the Slip Coupling applies its repetitive engagement and disengagement actions. On each passage from a disengagement to an engagement, it applies the sum of the driver's instantaneous torque output and the flywheel inertia which is stored up in the driver during the coupling's low-load disengagement travel. On each passage from an engagement to a disengagement, it limits the applied "hammer-blow" to the adjusted torque limit, thus preserving the original protective effect. Because the "hammer-blow" is thus limited and because it is derived from a repeated engagement and disengagement action pattern, it has the additional feature of exerting a cumulative rather than a "one-time" action. In this respect and in three other most important ones, it presents sharp advantages over "hammer blows" which are derived from lag or backlash effect:—(1) it does not leave the frictive region and enter the free-running zone with a lag effect to prevent accurate positioning of the driven mechanism; (2) the "hammer-blow" effect is automatically called in whenever it is required,

regardless of the portion of the mechanism's travel during which the wedge-spot occurs; (3) it does not require a reversal of the mechanism's travel to develop the "hammer-blow" effect.

Lastly, as regards the switch-tripping and "hammer-blow" capabilities of the Coupling, it is possible by proper electrical interlocks to exert the switch-tripping action in one direction of travel and to exploit the repetitive "hammer-blow" effect in the opposite travel. This is of importance to machines which are driven into "stops" and which develop wedge-effects in consequence of this, and it is of equal value to devices which must be backed-off "high spots." It is also possible via well-designed electrical interlocks to combine the switch-tripping and repetitive "hammer-blow" effects to limit the number of "hammer-blows." In such an arrangement, the switch acts to trip an electrical counter with a preset count-limit.

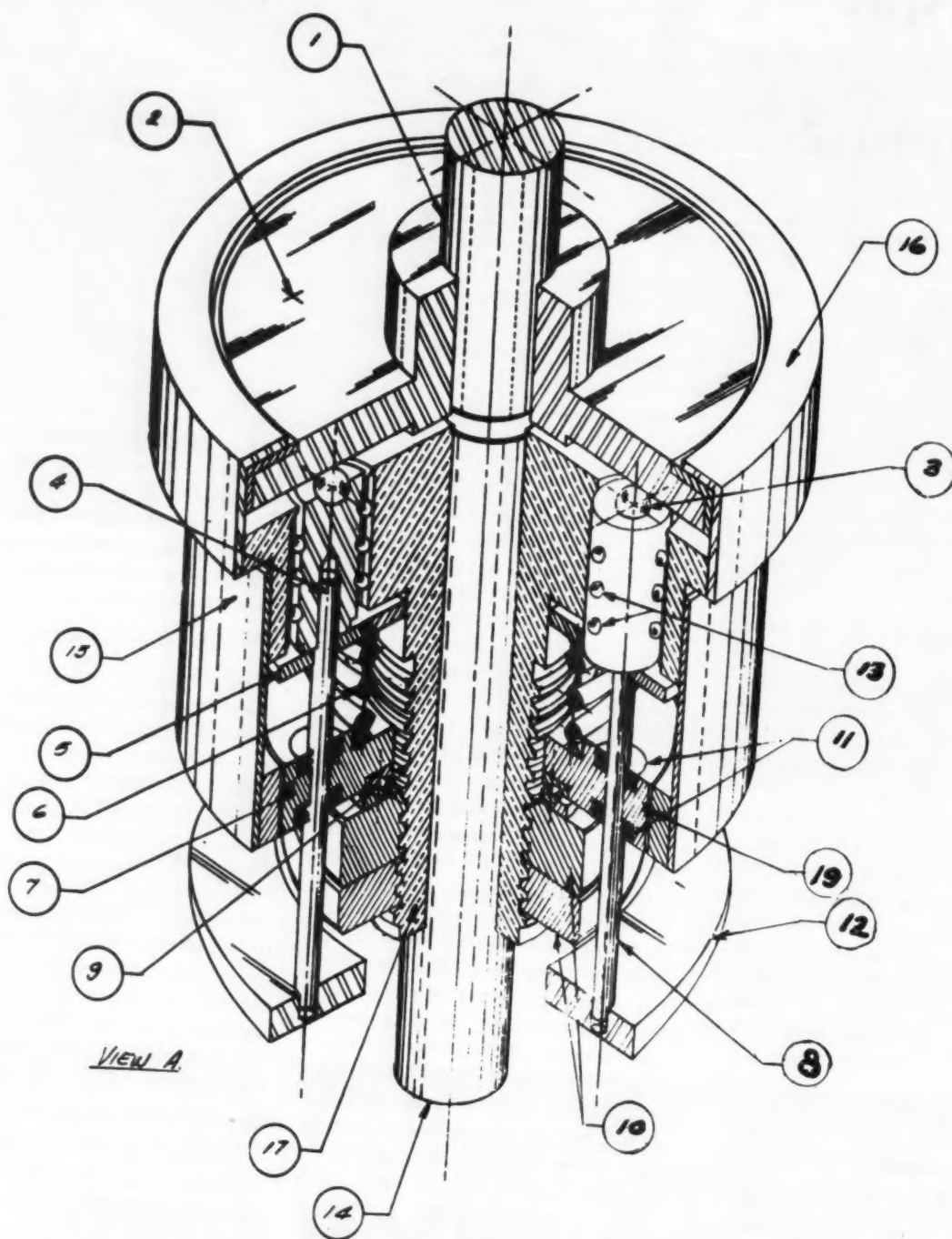
Speed and torque range—

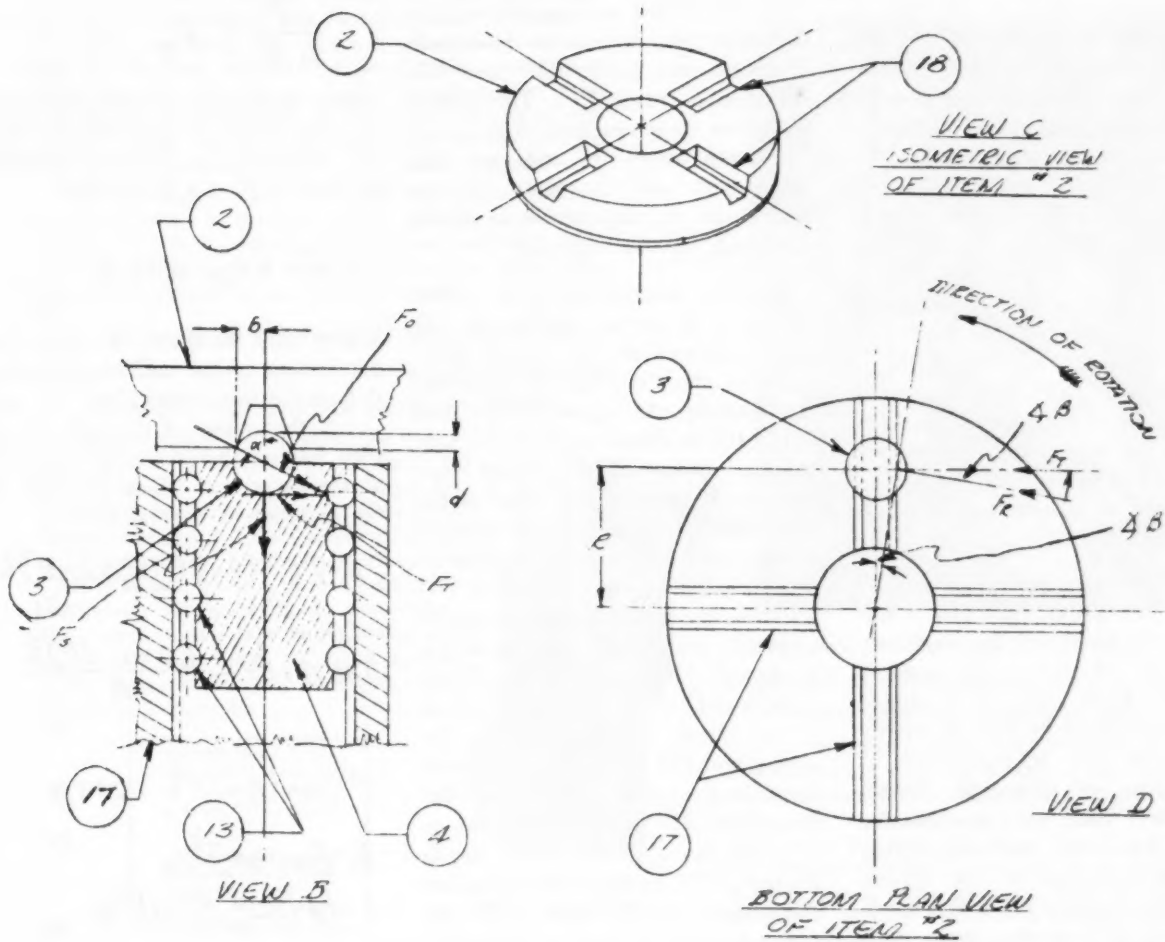
Techniflex Slip Couplings are designed to act at all speeds up to conventional electrical motor speeds. As to torque range, they are available in standard nominal ratings from 24 inch-lbs. to 100,000 in.-lbs. All Couplings are adjustable from 50% to 150% of their nominal ratings. As to their definition, the Slip Couplings act within 5% of their adjustment. In adjusting a Coupling, the adjustments are made externally with an absolute minimum of "brute force" required and the adjustment is to be a calibrated scale-and-indicator pin arrangement.

Description of operation—

Drawing B-2014 depicts the Slip Coupling from the components and the force patterns points-of-view.

In transmitting a given load, driving shaft (1) applies its power to transmitter-plate (2). The method of tying (2) to (1) may be via keys, pins, or any other conventional practice. Via the radial grooves (18) which appear in the bottom surface of (2). see Views "B", and "C", and





THE TECHNIFLEX CORP. NEW YORK, N. Y.	
TITLE TECHNIFLEX SLIP COUPLING	
DRAWN SAP	DATE 1/13/55
CHECKED V	SCALE None
APPROVED	DWG. NO. B2014

"D", (2) transmits the load to ball bearings (3). In doing this, the balls are gripped by the grooves as shown in View "B". From two to eight such grips, depending on the Coupling's rating, are involved in standard constructions.

The reactive force of the ball to this loading (see View "B") is F_o , which is reducible to the horizontal force F_t and the vertical force F_s . The horizontal force F_t is in turn a component of the tangent force F_r . (See View "D"). In this case, then F_r multiplied by the number of such balls and by the radius R (see View "D"), is the transmitted torque. Turning to (F_s), and considering this ideally, it is related via the angle P (see View "D") and the angle β (see View "B"), to F_r . By this perspective, it follows that for angle given value of the transmitted torque, the force per ball against the spring (6) is fixed by a simple trigonometric relationship.

In developing the total reactive load on the spring, each ball transmits its F_s force via the vertically guided race (4) to a spring-pressure plate (5). Each race (4) is guided in its detent-travel by four diametrically-opposed sets of balls such as (13). Before and during the detent-action, these balls (13) are also the means whereby the transmitted torque is delivered to the driven-half of the coupling (17). The method of tying (17) to the driven shaft (15) is, as in the case of (1) and (2), a matter of conventional practices. In countering the summed displacement force on the spring (6), the spring is given a preset deflection or loading. This loading, via the above-described relationship between F_s and the transmitted torque determines the torque limit at which the detenting will take place. Thus, as soon as the torque reaches a value at which the summed loads F_s exceeds the preset loading of the spring, the spring yields. In yielding, the angle diminishes, increasing the value of F_s as the yielding increases. Accordingly, at a sharply defined value of the transmitted torque, the races (4) detent until the raised por-

tions of (2)'s bottom surface ride over the top surface of the ball in a slipping action. As the race (4) detents completely, the torque load on (2) falls off sharply, immediately relieving the driver of overloading.

As the detent action develops, the rods (8), which are force-fitted into the races (4), are driven downward through the seals (11) and the spring-pivot place (7). This action is in turn communicated to the plate (12) into which the rods are also force-fitted, and the plate (12) is then used to trip whatever limit switching may be required.

By this description, it is patent that it is the preset loading on (6) which determines the torque limit value of the Coupling. In adjusting this loading, the upper of the lock nuts (10) is driven against the bottom race of ball bearing thrust bearing (9). Because of (9), none of the nut's rotary motion is communicated in the form of torsional loading to the spring. The upper race of (9) transmits the thrust loading to pivot-plate (7), and via this member to the spring (6). The pivot plate (7) is radially-guided by the flat surface of the acme thread, relieving the spring and the assembly as a whole of sliding motion. In driving the pivot-plate (7), an indicator pin in (7) (see *dwg.*), is moved in a slot in the skirt (15). By the vertically-scaled calibrations on the skirt (15), the spring loadings in terms of the transmitted torque settings are indicated.

Towards relieving both of coupled shafts of thrust loading, the spring reaction is consumed in the thrust loading of the top surface of (2) by the thrust ring (16). (16) is attached to the driven-half of the coupling (17) by screws. By the combined enclosing functions of (15) and (16), the entire assembly is sealed off against weather, and because of a lip seal (19) which bears against a mating surface of (15), the assembly provides for sealed-in lubrication.

The quantitative aspect of the coupling's design—

For the benefit of those who would like an insight into the quantitative

relationships underlying the above-given description of its functioning, the following is presented:

Where (T) denotes the transmitted torque, it follows by definition that the force F_r is set forth by

$$\frac{T}{nR} = F_r \quad (1)$$

where the number of balls = (3) and R is the radius as indicated in View "D". Similarly, by the force triangle in View "D", it follows that

$$F_T = F_r \cos \beta \quad (2)$$

Where (d) in View "B" gives the penetration of the ball into the grip-slot in the transmitter-plate (2) and (r) is the radius of the ball (3), it then follows that since (o), one-half of the chord cut off on the ball by the grip-slot, is defined by

$$b = [r^2 - (r-d)^2]^{1/2} = [2rd - d^2]^{1/2} \quad (3)$$

and since

$$\tan \beta = \frac{b}{r} = \frac{[2rd - d^2]^{1/2}}{R} \quad (4)$$

and $[\tan^2 \beta + 1]^{-1/2} = \cos \beta$

$$F_T = [\tan^2 \beta + 1]^{-1/2} F_r \quad (5)$$

$$F_r = \frac{[2rd - d^2]^{1/2}}{R} F_r \quad (6)$$

Referring to View "B", here the force triangle indicates that

$$F_o = \frac{F_T}{\sin \alpha} \quad (7)$$

Accordingly, since

$$\sin \alpha = \frac{b}{r} = \frac{[2rd - d^2]^{1/2}}{r} \quad (8)$$

then

$$F_o = \frac{F_T r}{[2rd - d^2]^{1/2}} \quad (9)$$

Again, since the force diagram in View "B" indicates

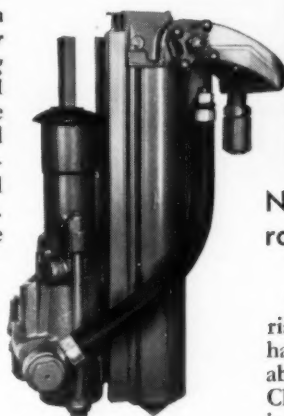
Revolutionary New Stoper for Drilling Roof-Bolt Holes Now Available

Since the very beginning of roof-bolting as applied to coal mines, the Cleveland Rock Drill Division has devoted a great deal of time and effort to provide the miner with a better method of producing roof-bolt holes. We have long realized that the equipment available to the miner, including our own, was not entirely satisfactory. In the past, stopers have been much heavier than necessary, and this excess weight has become a very serious factor, particularly in the lower coal seams. In the past there has been no stoper that would operate satisfactorily and efficiently in coal under about 36".

Wet drilling, as a method of dust suppression, has not been acceptable to the coal miner, and dust collection systems have been both cumbersome and inefficient. Machine maintenance has been high and in some very difficult conditions it has been excessive.

The Cleveland Model S20 Vac-Nu-Matic Stoper has many new features that simplify previous roof-bolt drilling problems

With the foregoing in mind, the Cleveland Rock Drill Division has designed an all new stoper that *eliminates causes for complaint found in other roof-bolting stopers*. The result is the Cleveland Model S20 Vac-Nu-Matic Stoper mounted on the Drift-Nu-Matic Feed, a *new bit* designed particularly for use with our dust collection system, a *new type of drill steel* and an *entirely new dust collection system*. These items are discussed at length in the following paragraphs.



Close-up view of
S20 Vac-Nu-Matic Stoper

The Model S20 Vac-Nu-Matic Stoper, together with the Vac-Nu-Matic Bit, Vac-Nu-Matic Steel, and the Vac-Nu-Matic Dust Box, were designed to be operated as a unit. Substitutions for any one, or all, of these units will result, at the best, in unsatisfactory operation and, what is more probable, no operation at all. In designing these various parts to operate as a unit, we were not activated by a desire to produce a package unit. The simple facts are that all of the units mentioned are interdependent in their operation, and in order to achieve certain definite results, it was necessary to design components that would produce those results.

New design provides for short overall height — operates easily in 26-inch coal

The Model S20 Vac-Nu-Matic Stoper is a standard percussion type drill up to a certain point; beyond that point it was necessary to go into complete new design. The basic problem was to design a machine that would have the shortest possible overall length. In any conventional model of percussion type drill, only two points

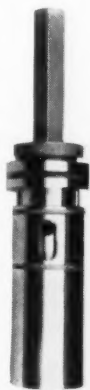
present themselves where the machine can be materially shortened. By removing the valve from the inside of the machine and by using an external valving mechanism, we eliminated considerable length.



Novel Sav-A-Change Chuck speeds the roof-bolt drilling operation — reduces number of steel changes

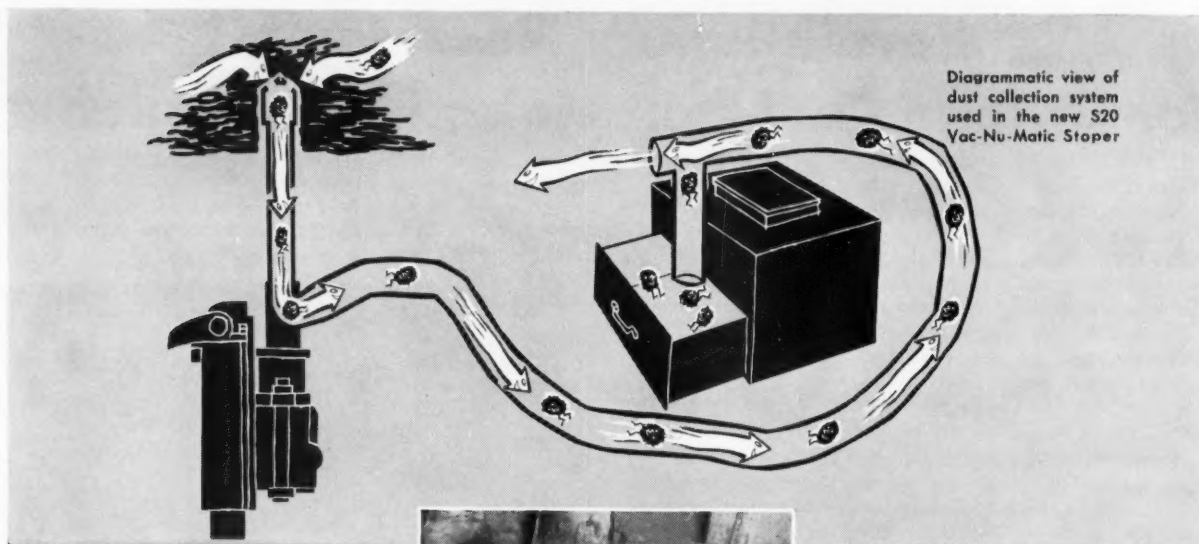
The only other point susceptible to any material shortening is in the design of the chuck. We have designed this machine with two chucks available — the standard socket type and the Sav-A-Change, or peg type of chuck. The Sav-A-Change is a completely new departure in chuck design and enables us, in most cases, to drill a hole four inches deeper than the seam height, without using coupled steel and without drilling an oversized starter hole to enable us to cock the steels that follow. Dust collection through either type of chuck is the same.

No steel is lost in chuck in Sav-A-Change design.
Holes can be drilled four inches deeper



Sav-A-Change
Chuck





Diagrammatic view of dust collection system used in the new S20 Vac-Nu-Matic Stoper

Unique Built-in Dust Collection System prevents machine wear — handles wet top

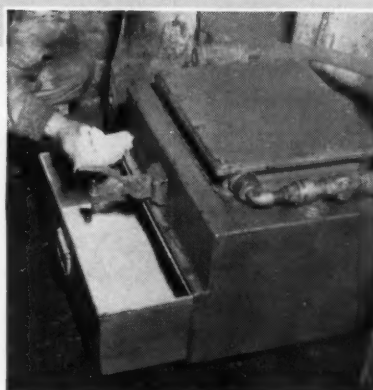
The S20 Vac-Nu-Matic Stoper is the only stoper having a built-in dust collection system that does not remove (or pass) the cuttings through the body of the machine, nor does it use any type of external hood, or dust collection tube. Cuttings are removed through the side of the chuck housing immediately after they leave the drill steel. They are collected from the face through holes in the bit and down through the center of the drill steel.



S20 Solid Stoper Piston

Solid forged parts provide greater strength for longer service life

By eliminating the dust collection through the machine itself, we have been able to seal the machine from external dirt, and since a dust collection tube through the machine is not required, we were able to design solid parts for longer life. The piston is a solid forging and has no holes through the center. The rifle bar is also a solid forging and likewise has no center hole.



Vac-Nu-Matic Dust Box handles wet top easily

Chuck assembly is designed with new principle that permits replacement of chucks underground without dismantling machine

The chuck itself is a solid piece of metal and is not splined to the rotation mechanism as it is in conventional designs. The rotation mechanism consists simply of three slots in

the chuck which match similar slots in the chuck sleeve, and the connection is through three small round pins. The entire chuck assembly is retained in the chuck housing by means of a simple snap ring, and the chuck can be replaced without dismantling the machine. The only tool necessary to replace the chuck is a pair of snap ring pliers. This means that chucks may be replaced underground without the necessity of sending the machine to the machine shop or to the surface.

A unique design has been adopted in controlling the flow of dust and cuttings through the chuck. In this design, wear, attributable to particles of rock impinging on steel surfaces, has been eliminated. The chuck has been so designed that at all points where the directional flow changes a slight build up of dust and cuttings is allowed, thereby allowing the cuttings themselves to protect the steel parts and absorb the wear.



Only snap-ring pliers needed to change S20 chuck

New-type chuck practically free from reciprocating wear

The chuck itself is a floating design. In all present chuck styles the drill rod has a reciprocating action within the chuck. This reciprocating action, combined with the inevitable dirt that finds its way into the chuck, adds up to a wearing or grinding action that, in severe cases, can cause a chuck to become inoperative in a shift, or less. Our new chuck design allows the chuck to float with the steel and eliminates practically all wear due to reciprocation. Inasmuch as the chuck can be sealed off from the rest of the machine, no dirt gets into the body of the machine either from drilling, or from what might normally be carried into the chuck from dirty drill shanks.

S20-Vac-Nu-Matic lightest weight dust-collection type of stoper on the market

The S20 Vac-Nu-Matic Stoper is the lightest dust collection type of stoper on the market. It weighs sixty-nine pounds complete, in the 28" feed size. Other standard feeds available are 46" and 64".

Need for low overall height and long feed led to the development of the Drift-Nu-Matic feed

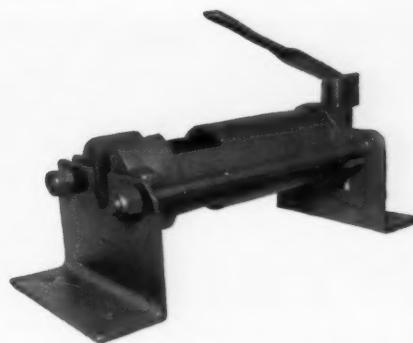
In order to achieve an exceptionally long feed, together with very low height, it was necessary to disregard former feeds and standards of mounting.

With this in mind, the Drift-Nu-Matic Feed was designed. This is an air piston combined with a chain in such a manner that the travel of the machine itself is double the travel of the feed piston. This is the only stoper in which the drill always starts its feed travel at the bottom of the stoper. Regardless of the lengths of feed, the overall starting height of the machine is the same.

In conventional type stopers, whether they are telescopic or otherwise, the starting height of the machine varies according to the length of the feed leg. The overall starting height of the S20 Stoper in all cases is 16½", which means that the length of your starter steel in any case is the difference between 16½" and your seam height, or, in the case of the Sav-A-Change Chuck, the overall height governing the starter steel length is 20½". This means that in practically all cases, at least



Note unusual shape of Vac-Nu-Matic Bit



Cleveland air-operated bit knock-off machine

Unusual Vac-Nu-Matic bit gives key to success of dust collection system and Sav-A-Change Chuck

At the other end of the system we have the Vac-Nu-Matic Bit. This bit is the result of several hundred design experiments and was selected for a number of outstanding qualities. In the first place, it is an exceptionally fast cutting bit. It has adequate pick-up area to insure that all dust and cuttings are collected through the bit itself.

It is designed with an offset shoulder. This feature makes the bit entirely free cutting which, in turn, means that drill steel will always

drop out of the hole freely. There are no stuck steels using the Vac-Nu-Matic Bit.

This bit is the key not only to the dust collection system but to the stoper itself, as it would be impossible to use a Sav-A-Change chuck with other types of bits. With the Sav-A-Change type of chuck the steel must drop out of the hole freely. The connection between the Vac-Nu-Matic Bit and the drill steel is the standard CRD taper connection.

one steel change is eliminated as opposed to conventional type stopers. In some cases, two steel changes are eliminated.

New type steel also aids in positive dust collection

The Vac-Nu-Matic Steel is standard in its external appearance and has a standard CRD taper connection on the end. It has, however, been rolled with a large hole in the center to insure complete dust collection. The large hole is necessary for satisfactory operation. The large hole does not weaken the steel beyond acceptable limits. Field testing of this type of drill rod over a period of several months has revealed no steel breakage whatsoever.

Vac-Nu-Matic Dust Box pulls high vacuum — uses little air

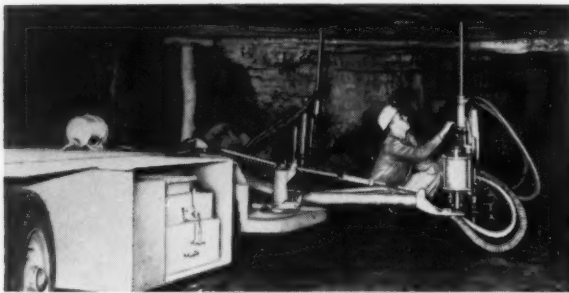
The Vac-Nu-Matic Dust Box is of our standard design with the exception of the venturi. A completely new venturi has been designed that operates on 18 cubic feet of air per minute.

Eighteen cubic feet of air per minute at eighty (80) pounds pressure will produce a static vacuum of 16½" of mercury; fluid vacuum, while the

machine is operating, is 13" of mercury. These figures compare to ten to twelve inches static and as low as ½" fluid in competitive dust collection systems. Cuttings pass into the collection box through a series of baffles which insure that the dust pan fills evenly. Filter bags separate the dust collection chamber from the vacuum chamber.

The box has a capacity of 1¼ cubic feet which is the approximate equivalent of ten 1⅜" diameter holes of average depth. One of the serious problems in dust collection boxes has been the very considerable wear factor due to impingement of dust particles on the metal surfaces inside the box. Here again we have designed to the end that dust is allowed to accumulate at wear points to the extent that it covers and cushions these points and absorbs the wear. There is very little wear in any part of the Vac-Nu-Matic Dust Box and no dust or cuttings passes through the venturi, thus eliminating wear at that point.





S20 is also designed for use with jumbos

Brief summary high-spots the advantages of new S20 Vac-Nu-Matic Stoper design

The Model S20 Vac-Nu-Matic Stoper and dust collection system was especially designed for roof-bolting. It is suitable for any seam height and is the only practical stoper in seams from 36" down to 26". The stoper, dust collection system, steel, and bits are designed as a unit and are interdependent, to produce an exceptionally fast drilling machine with superior free cutting and dust collection qualities. The design of the bit promotes fast cutting action, together with perfect dust collection, and the drill rods will always drop free out of the hole. There is less rotational drag on the machine and no stuck steels even in soft ground.

The drill steel has an oversized opening that passes all cuttings freely. The dust collection system operates with very low air consumption and an exceptionally high vacuum to insure complete collection. Cuttings are removed from the drill at the chuck housing and do not pass through the drill. Because of the large openings and the high vacuum, wet top presents no problem in

dust collection. Our tests indicate that we can collect dust that, when taken from the collection box, will adhere together, and may be balled like a snowball. The design of the Vac-Nu-Matic Stoper is such that it is suitable for use either as a hand-held machine or for jumbo mounting.

First basic change in stoper design since the advent of the self-rotator

The Model S20 Vac-Nu-Matic Stoper, together with its Drift-Nu-Matic Feed, represents the first basic change and improvement in stoper design since the self-rotator.

It is the only stoper that will drill in a hole deeper than the height of the coal seam, without coupled steels.

It is the only stoper that will drill a deeper hole with one steel change than any standard stoper will with two changes.

It is the only stoper that allows chuck replacement without dismantling the machine.

It is the lightest dust-collecting type of stoper available.

It is the only stoper that always starts its feed travel at the bottom of the feed cylinder and continues its feed past the top of the feed cylinder.

It is the only dust-collecting type of stoper that does not remove dust through the body of the machine nor does it use any type of external hood or dust collection tube.

It is the only stoper that is practical in seams down to 26".

From this time on, we feel that the Cleveland Model S20 Vac-Nu-Matic Stoper with its many advantages, will become the *standard of the industry*.



Write or call the Cleveland Rock Drill Division — WABCO for an immediate free demonstration in your own mine.

CLEVELAND ROCK DRILL DIVISION

Westinghouse Air Brake Co.

12500 BEREA ROAD
CLEVELAND 11, OHIO

$$\frac{F_T}{F_S} = \tan \alpha \quad (10)$$

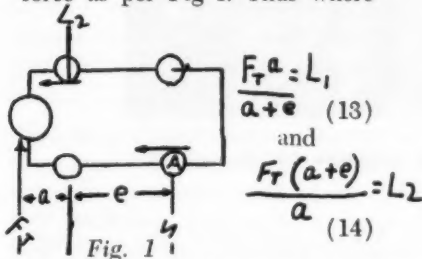
and since

$$\tan \alpha = \frac{b}{r-d} \quad (11)$$

then

$$F_S = \frac{F_T (r-d)}{[2rd-d^2]^{\frac{1}{2}}} \quad (12)$$

The vertical force on the race (4) as seen by the spring is however diminished by the sliding friction force as per Fig. 1. Thus where



Then, $(F_S)N$, which is the net spring load per ball, is given by—

$$F_S - f(L_1 + L_2) = (F_S)N = F_S - F_T f \left(\frac{a}{a+e} + \frac{a+e}{a} \right) = (15)$$

Of paramount importance to the design are the conditions that F_0 should not exceed the safe loading of the ball and that the bearing pressure against the loaded surface of the hemispherical groove in the race should not exceed a conservative bearing pressure.

The heaviest loading of this surface is clearly from the direction of F loading the surface which is cut-off by the chord A-A in Fig. 2. If the loaded surface is designated by S_y , then clearly

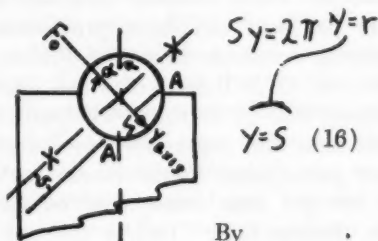


Fig. 2 $x = [r^2 - y^2]^{\frac{1}{2}} \quad (17)$

which is the analytic expression for a circle, and the derivative expression

$$2x dx = -2y dy \quad (18)$$

equation (16) takes the form

$$S_y = 2\pi \int_{y=S}^{y=r} [r^2 - y^2] \left[1 + \frac{y^2}{r^2 - y^2} \right] dy \quad (19)$$

and, or integration, we obtain

$$S_y = 2\pi r^2 \left[\frac{\pi}{2} - \sin^{-1} \frac{y}{r} \right] \quad (20)$$

Accordingly, (P_0) which defines the average bearing pressure against the noted surface is given by—

$$P_0 = \frac{F_0}{2\pi \left(\frac{\pi}{2} - \sin^{-1} \frac{y}{r} \right) r^2} \quad (21)$$

In the design of the spring (6), the key consideration is that $-\frac{dF_S}{da}$ the increment of F_S as the (d) is converted from a penetration of the grip-slot to a compression of the spring, be equal to or has less than the spring's loading constant. Towards defining this limit, equation (12) is differentiated. It yields:

$$2F_S dF_S = \frac{F_T (2r-2d) r^2 dd}{2rd-d^2} \quad (22)$$

which by combination with (12) itself gives

$$\frac{dF_S}{dd} = \frac{F_T r^2}{[2rd-d^2]^{\frac{3}{2}}} \quad (23)$$

● MARION Power Shovel Company of Marion, Ohio, is announcing the appointment of Robert Campello as sales manager.

In his new post Mr. Campello will be in charge of sales of all Marion machines sold through distributors in the United States and Canada. These machines include a complete range of power shovels sizes from $\frac{1}{2}$ to 4 cubic yards dipper capacity and cranes from 15 to 160 tons lifting capacity.

A veteran of long standing in the

power shovel industry, he was associated with the Bucyrus-Erie Company of South Milwaukee, Wisconsin, for 17 years in various sales capacities prior to coming to Marion. He served as manager of Bucyrus-Erie's office in Washington, D. C., where he was in charge of all the firm's governmental operations.

From 1929 to 1938 he was associated with the Tractor and Equipment Co. and the H. O. Penn Machinery Company, distributors of construction machinery in New York City, and from 1927 to 1929 he was a member of the Real Estate Dept. Engineering Division of the Westchester County Park Commission in Westchester, New York.

Born in New York City, he spent his boyhood in Pelham, New York. He attended Lafayette College in Easton, Pennsylvania, where he majored in economics and business administration.

He and Mrs. Campello, the former Miss Katherine Sharkey of New Rochelle, New York, are parents of two sons, Robert, Jr., 24, a U. S. Air Force officer stationed in England, and Stephen, 10.

● PENN Machine Company has announced the appointment of Jack L. Berkebile as district sales manager with headquarters in Johnstown, Pa. Mr. Berkebile will be in charge of sales in the territories of Pennsylvania, Ohio and Northern West Virginia. He has been associated with Penn Machine Company for the past twenty years as a salesman.



JACK L. BERKEBILE
Penn Machine Co.

Robena Mine Safety Rally

Over 3,000 spectators from Uniontown and the neighboring communities joined officials from the United Mine Workers of America, United States Bureau of Mines, Pennsylvania State Department of Mines, and the United States Steel Corporation in paying tribute to the miners and supervisors of U. S. Steel's Frick District's Robena Mine during a safety day rally.

A total of 2,799 production and supervisory employees were honored during ceremonies held at the Ma-sontown athletic field for their successful 100 per cent attendance while participating in the U. S. Bureau of Mines' Accident Prevention Course.

All of the Frick District mines and plants, a total of 6,601 employees have a 100 per cent participation in the accident prevention course. The mines and plants are: Bridgeport, Collier, Colonial Belt, Filbert Shop, Karen, Leisenring No. 2 and 3, Leckrone Timber Treating Plant, Maxwell, Palmer, Robena and Ronco.

A 20-hour accident prevention course, covering virtually all phases of mine safety, was taught by J. B. Yanity, Federal Mine Inspector, assisted by W. M. Merritts.

Charles Ferguson, safety director, United Mine Workers of America, presented a safety training certificate to Alfred E. Cavalcante, president, Robena UMWA Local 6321. In presenting the certificate, Mr. Ferguson said, "I think I am qualified to say that this is the greatest accomplishment in increasing safety in the mining industry that has ever been done. One reason I am proud of this accomplishment is that in 1927 when this course was made available to the men of the industry, a little less than 2,000 people availed themselves of the opportunity to get this training. As of today there are over 115,000 of our people who have taken this training. I might say that we are on the verge in your District No. 4 of being the first district to complete this training with 100% participation. To



Over 3000 spectators attended the ceremonies held on April 30.

make this possible, it took the full co-operation of every man, woman and child of the employees and of the lowest and highest of management officials of the companies."

"You are fortunate to be working for the United States Steel Corporation, a company that is so safety-minded. They are accepting their responsibility of furnishing you a safe place in which to work, but unless you put in effect, every day you enter the mine, the things you have been taught to do, these certificates you receive today will not be worth the paper they are written on."

In accepting the certificate from Mr. Ferguson, Mr. Cavalcante said, "I deem it a great honor to accept this citation on behalf of the members of the Robena Mine Union. To me and to the members it represents a great achievement in that we achieved a 100% attendance record. This record would not have been possible without the determination of every member of the local union and the supervisory personnel of the U. S. Steel Corporation. We feel that with the acceptance of this certificate, it becomes an obligation for us to set a new safety record, which will fulfill the purpose and intent of this training program."

Mr. Cavalcante also received a safety training certificate from James Westfield, assistant director, health and safety, U. S. Bureau of Mines.

Mr. Westfield also presented Michael B. Girod, Superintendent, Robena Mine with a 100 per cent accident prevention training certificate. John C. Durfee, superintendent, Robena coal preparation plant, also received a certificate.

Mr. Westfield said, "Here is an example, and particularly the greatest example we have ever had, of getting management and union together to talk and act on safety." In accepting the certificate from Mr. Westfield, Mr. Girod said, "We at Robena Mine are very happy to receive this certificate. We are very aware of the tremendous responsibility that goes with it."

W. R. Stedman, general superintendent, Frick District, received a 100 per cent accident prevention training certificate from J. J. Forbes, director, U. S. Bureau of Mines, signifying that all of the Frick District workmen and supervisory personnel had participated in the course with a 100 per cent attendance record. Mr. Forbes said, "This is the outstanding accomplishment with respect to this accident prevention training

All of the workers and supervisors from Robena and the other mines and plants of the Frick District are to be congratulated for their efforts. You men who have taken this course of safety instructions, I know, have taken it at great sacrifice, but I am sure it will be of benefit to you not only in the protection of your own well being, but also in the protection of your fellow workmen."

Mr. Stedman, accepting the certificate from Mr. Forbes, said, "I am proud to be a member of an organization that has earned such a certificate. I would like to thank all employees of the Frick District for their participation in this training program."

"It is a distinct pleasure to see a large crowd like this and in particular a group so interested in safety," J. V. McKenna, acting deputy secretary, Pennsylvania State Department of Mines, said: "The more we can think of safety," he said, "and the more we study safety, the sooner we will improve our safety records by reducing the accident rate. Please remember, the best safety device is a safe workman."

James C. Gray, Vice President, Operations—Coal, U. S. Steel, said, "We could not have had a finer purpose for gathering here this afternoon than to congratulate everyone for the outstanding job of finishing with 100 per cent attendance the accident prevention training course in the entire Frick District. We in management of the coal mines of U. S. Steel believe honestly and sincerely that accidents in mines can be prevented. I feel that in the accomplishment that you men have made, you have taken the necessary steps to make it a reality in all of our corporation mines. With the attack that we both have made toward accidents, with the knowledge that we can and will provide adequate facilities, and with God's help, I see no reason why the Coal Division, in which you men are working, should not become as safe as any other industry I know of and which you might work."

William J. Hynes, president UM-



During the Robena Mine Safety Day Rally held at Masontown recently, Michael B. Girod, Frick District's Robena superintendent (right), was presented with an Accident Prevention Training Certificate by James Westfield, assistant director, health and welfare, Bureau of Mines. Also receiving certificates were, (left) A. E. Cavalcante, president, Robena Local No. 6321, and J. C. Durfee, superintendent, Robena Washer (3rd from left). Over 3000 spectators attended the ceremonies.



Looking over the program for the Robena Mine Safety Day Rally are seated (left to right), James C. Gray, vice president, operations—coal, U. S. Steel Corporation; Charles Ferguson, safety director, UMWA; J. J. Forbes, director, U. S. Bureau of Mines. Standing, James Westfield, assistant director, health and safety, U. S. Bureau of Mines, and J. V. McKenna, acting deputy secretary, Pennsylvania State Department of Mines.

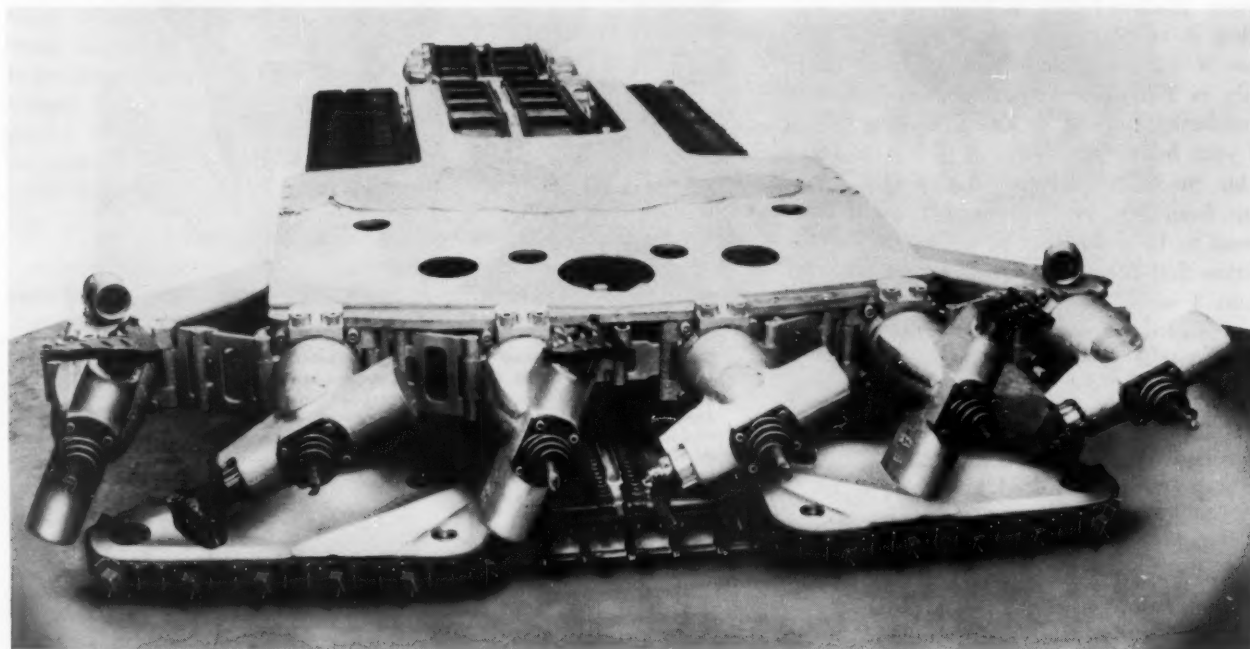
WA District No. 4 said, "The reason I am so pleased with this safety rally is that all the members of the United Mine Workers of America and all supervisors at Robena Mine were together in one body in order to accomplish this great feat."

In welcoming the UMWA and the U. S. Steel Corporation to Masontown, John C. Nagy, Masontown burgess said, "Today we are honored not only by labor but also by manage-

ment. Where else, outside the United States, could you hope to find a similar event. You both are to be congratulated for your fine safety record. I hope that this co-operative spirit between the UMWA and the U. S. Steel will continue for years and years."

All the employees have already received pocket type certificates and diplomas from the Bureau of Mines.

Mental Tests Replacing Snap Judgment In Employment For Industry



Leroi-Westinghouse Continuous Mining Machine shown for the first time at the Cleveland Coal Show. Can be push-button or manually operated.

Mental tests are now replacing intuition and snap character judgments in picking individuals for employment or promotion in industry or business.

Few personnel men today would pick a man for an important job because they approve his choice of neckties, or like the "way he looks you in the eye." They would not refuse a man a job just because he came in to apply after three o'clock in the afternoon or because he drives a Chevrolet rather than a Ford. The modern method is to give a test.

Psychologists warn, however, that it is a mistake to rely blindly on test results. The value of a test score depends upon the use you make of it. It must be properly interpreted and considered in connection with a great deal of other information about the applicant.

But tests, wisely used, can give you in an hour or two or even in less time the essence of what you

could learn about a person's performance by watching him at work over a period of years.

Oldest and most valuable in the armament of tests is the intelligence test. This is often called a general learning ability test or adaptability test. It measures a person's ability to learn and to profit by experience. It gives you an assessment of his alertness. It tells you whether he is bright or dull; whether he is aware of what goes on around him or whether he never notices.

The person who scores high on this kind of test is the one with a high I.Q. He is capable of doing well at a great variety of tasks, provided he has the necessary interest or motivation and provided he is given an opportunity to learn the job.

Next in importance and usefulness are the aptitude tests. Such tests do not measure how good a person is at a particular kind of work.

Neither do they measure his general ability to learn. But they can be given to a young person, as yet without training, and can predict whether he has the necessary special talents so that he can learn the work and make good at it.

Employment offices of the U. E. Employment Service have available a "battery" of such aptitude tests. In addition to general intelligence, they measure such special abilities as verbal ability or facility with and understanding of words, numerical ability, spatial ability, finger and hand dexterity, motor co-ordination and proof reading.

Some of these abilities have two aspects. Numerical ability, for example, includes an ability to carry out computations with accuracy and speed—the ability of a human calculating machine. It also includes mathematical reasoning. The latter of these abilities is what enables a person to visualize a problem and set it down

correctly; the other makes it possible for him to work out the answer.

Spatial ability involves form perception or the ability to recognize and distinguish various shapes. It also involves the ability to look at the surface of an object, or a cut-away view of it, and visualize how the interior must look. This is what the mechanic needs to look at your car's motor and understand what goes on inside. It is what the architect needs to visualize from looking at a blueprint how the erected building will appear.

Such abilities as these are measured with paper and pencil tests.

For an evaluation of finger and hand dexterity, a different kind of test is given. In one such test, the individual reaches for one of a number of blocks ranged in order and places it in a particular hole in a board. This is continued until all the blocks are properly placed. Time is important, so that a premium is placed on smooth, efficient movements; clumsiness is penalized.

As a measure of finger dexterity, small objects such as pins are picked up and placed.

To measure his co-ordination, an applicant is required to follow a moving object with his hand, to move an object in response to signals picked up by his eye or to keep a gunsight trained on a moving target.

A battery of tests such as these, the Employment Service has found, can measure the talents needed in various proportions for 20 different families of occupations. Scores made by an individual on this battery can show the counselor whether or not he is fitted to learn any one of 1,500 different jobs.

Advantage of the battery is mainly that a single testing of an applicant with this group of tests can provide a measure of his fitness for vacancies that may come up later as well as for any job immediately available.

The U. S. Employment Service has found it possible to assign to

each of 2,000 occupations its own particular aptitude pattern in specific terms of scores on the tests.

Such jobs as involve creative writing, for example, or translating, copy writing or journalism fall into a pattern designated GV. An applicant for such a job must get a minimum score of 130 in general intelligence and 130 in verbal ability.

Accounting and similar work has a pattern call GN. To make good in this kind of work, an individual must make at least 130 on general intelligence and on numerical ability.

To make good at metal machining or mechanical repairing requires scores of 100 on intelligence, numerical ability and spatial ability and 85 on finger dexterity. The pattern is known to the experts as GNSF.

Quite as important for making good on a job as general intelligence or learning ability and special aptitudes, is mental health or emotional stability. Objective tests are not yet ready for spotting the person who is not a good mental health risk.

But during World War II, psychiatrists developed a technique for interviewing draftees that enabled them to screen out the mentally unfit. In fact, they developed this ability until now it is possible to reverse the process and "screen in" those who are in the best mental health.

Lagging even farther behind than the ability to screen out the mentally ill, or pick for placement those who are superior in mental health, is the ability to assess the character or personality of an individual with tests.

A banker would like psychologists to furnish him with a test that would show him which applicants would be likely to be tempted to let their fingers dip into the cash drawer.

There is no such test.

Neither, at present, is there perfected a test to tell which man would make an active, socially at ease, go-getter type that might be expected to make good as a salesman; or which would be best at thinking things through quietly as a plan-

making executive.

This latter type of test is on the way. At present, it is in the research stage and shows great promise.

One such test is in the form of a simple color film. The movie shows colored spots of various shapes moving across a clock face. If you are the kind of person who is impressed by the shape of objects, you may follow the apparent movement of one shape, say the round dot, as it appears to move from eight o'clock to two. The colors appear to flicker.

But if color means more to you than form, you may pay attention to one color and watch, say, the red dot, as it appears to move from two o'clock to eight. In this case the shape will seem to flicker.

The person who pays attention to color, psychologists have found, is of an entirely different temperament from the person who notices form. Each different type of person sees movement in a different direction.

This and other such objective tests of temperament were developed by Dr. L. L. Thurstone of the University of North Carolina.

Latest development in employment tests is a test for the boss. It takes the form of an "in-basket." The person taking the test must indicate the appropriate action for each paper in the basket. Information necessary as a basis for action may be contained in several separated papers at different layers in the basket.

IMPORTS OF RESIDUAL FUEL OIL

The following data on imports of residual fuel oil are taken from the Weekly Statistical Bulletin of the American Petroleum Institute:

Week Ended - May 13

<i>Imported Residual Fuel Oil 1/ Barrels</i>	<i>Daily Average</i>
1,911,000	273,000

<i>Bituminous Coal Equivalent 2/ Net Tons</i>	<i>Daily Average</i>
458,600	65,500

● LLOYD OLIVER has been named supervisor, mining sales, of the Carmet Division of Allegheny Ludlum Steel Corporation, Marlin R Hemphill, general manager of the division announced today. The appointment is effective immediately. Mr. Oliver joined the Carmet Division as a sales engineer in 1954.



A graduate of the University of Michigan, Mr. Oliver received his B.A. degree in 1950. He was previously associated with the Carboloy Division of General Electric and Bohn Aluminum. During the war he served with the Signal Corps of the U. S. Army.

The Carmet Division markets a complete line of carbide coal mining tools including cutting and drilling bits.

Publication of 5 catalog specification sheets covering the complete line of Austin Overshot Loaders is announced by the Austin Division, Central Ohio Steel Products Company, Galion, Ohio.

Describing Models 2-C, 4-C, 6-C, 7-C and 8-C respectively, the 2-color catalog sheets are illustrated with detail and action photographs of each Austin Loader, plus illustrations of available attachments. Dimensional drawings and condensed specifications pertaining to individual models are also shown.

Five Austin Overshot Loader models are now available. Suitable for mounting on Caterpillar D2, D4, D6, D7 or D8 Tractors and with capacities ranging from 1 to 4 cubic yards, Austin Loaders are sold and serviced through Caterpillar Dealers everywhere.

For copies of this new literature, contact any Caterpillar Dealer or

write Austin Division, Central Ohio Steel Products Co., Galion, Ohio; or 2 Santa Fe Drive, Denver, Colorado. Mention the approximate required capacity desired or give the model number of the Caterpillar Tractor on which the Loader is to be mounted.

The latest addition to Euclid's line of motor scrapers, the Model S-7, is now in production. As of the end of April, the first fifty-seven (57) units

have been shipped. In announcing this new scraper, V. L. Snow, Director of Sales for the Euclid Division of General Motors in Cleveland, pointed out that the S-7 gives Euclid a scraper line with 7, 12, 15.5, and 18 cu. yds. struck capacities. The latter is the "Twin-Power" model introduced several years ago.

A four-section cutting edge, with each section identical, adjustable and reversible, provides the most efficient

MISSING: 80 tons per man-shift

More and more coal mines are reporting big tonnages taken from their seams. Evidence points to the COLMOL: overlapping circles in face pattern . . . wide crawler marks on floors . . . minimum of noise, vibration and dust.

Jeffrey pleads guilty—of furnishing the large capacity continuous mining machine that cleaned out the rooms and robbed the pillars . . . a machine that is flexible, safe, easy to operate.

Motive? To increase coal production, lower mining costs and put coal in railroad cars at a minimum cost-per-ton figure.

Write for COLMOL literature.

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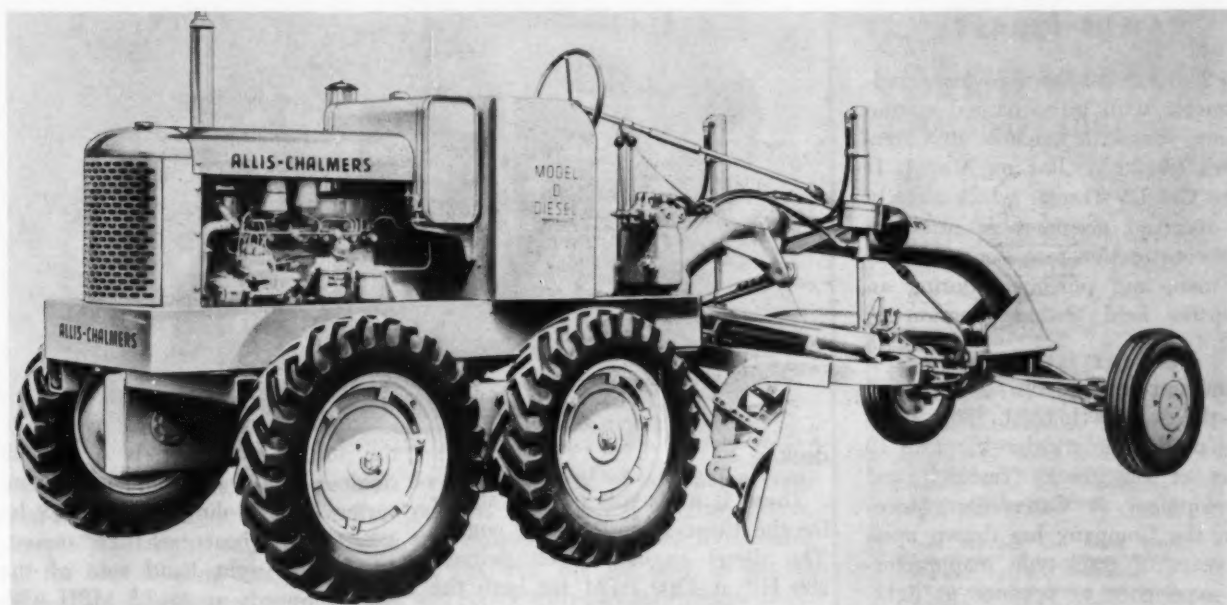
IF IT'S MINED, PROCESSED OR MOVED
... IT'S A JOB FOR JEFFREY!

WANTED —for coal seams 38" upward, the Jeffrey 76-AM COLMOL, a compact, highly productive unit for low-vein coal.

PATENTED

ARMED —with 10 overlapping breaker arms for mining medium-high seams 46½" to 72" high. The 76-B COLMOL has produced as much as 900 tons in a single shift with a crew of seven.

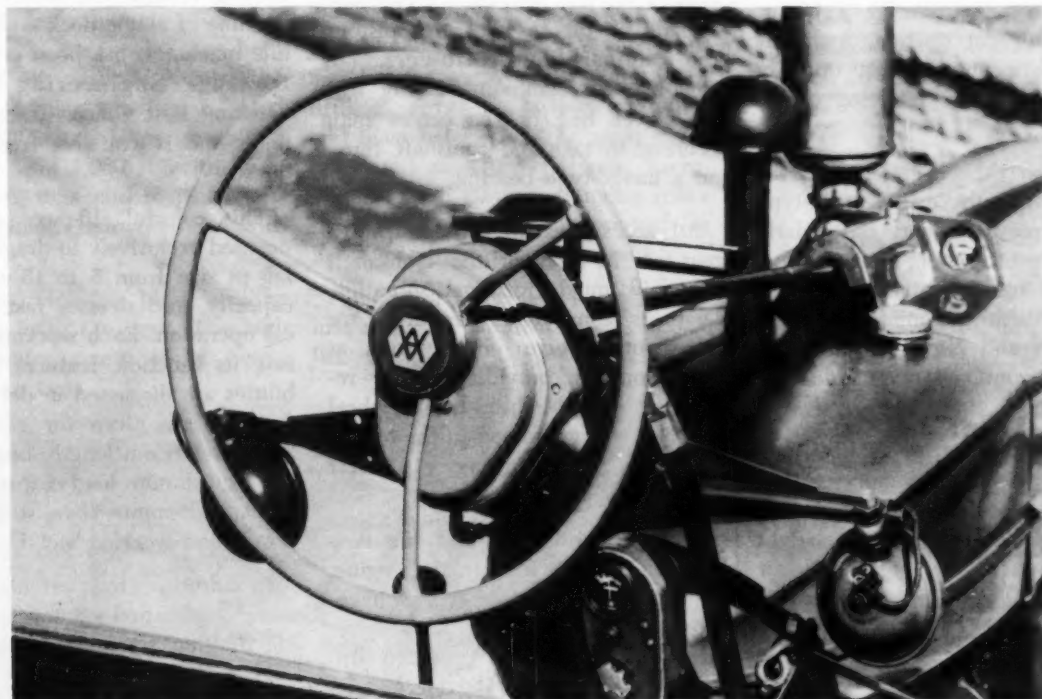
PATENTED



Allis-Chalmers is introducing the Model D Diesel motor grader with a new Allis-Chalmers 6-cylinder, valve-in-head Diesel engine rated at 50 brake h.p. at 1625 rpm. The Model D motor grader will continue in the line with gasoline engine.

The new Diesel engine has a 3 7/16-in. bore and 4 1/8-in. stroke, and 230 cu. in. piston displacement.

Direct electric starting on Diesel fuel is provided by a 12-volt starting system. Incorporated in this new engine are features such as replaceable wet-type cylinder liners; by-pass cooling system with high capacity water pump; pressure lubrication; aluminum alloy pistons; simple, easily serviced fuel injection system; and four filters to assure clean fuel.



NEW POWER STEERING DEVICE, pictured above mounted on a tractor, has been introduced by Westinghouse Air Brake Company. The unit, a hydraulic power steering device for off-the-highway vehicles, was designed to reduce the back-breaking job of steering such vehicles as hi-lift trucks and tractors to one-finger control. It is the only unit that can be installed on existing vehicles without structural changes in the vehicles.

CAT D9 STORY

A 230-drawbar horsepower crawler tractor with turbocharged engine became the sixth machine in Caterpillar's track-type line on May 1. It is the Cat D9 Tractor which already has received considerable attention from construction men, loggers, mining men, and pipeliners during an extensive field testing program in 1954.

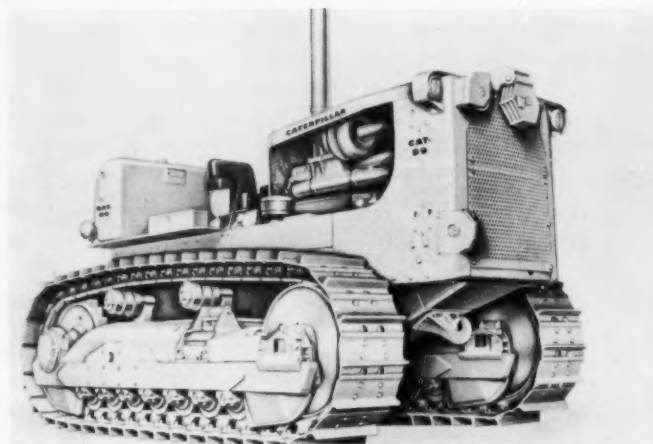
Announcement of the 56,000-pound D9—the world's biggest, most powerful production crawler—climaxes 10 years of big tractor research and development at Caterpillar. Moreover, the Company has drawn upon 50 years of track-type manufacturing experience to produce a "light-footed giant, with every part aimed at the kind of service which is too tough and too rugged for other tractors."

A new 6½x8, six-cylinder Cat Diesel Engine is equipped with a turbocharger, an advancement in track-type tractor manufacture. The tractor also will have Caterpillar's oil-type clutch or optionally a torque converter, in-seat starting, hydraulic track adjustment, excellent operator visibility and many servicing conveniences.

Caterpillar expects the D9 will be used in virtually every track-type tractor application and particularly in general construction, logging, pipe-laying, mining and quarrying. Some of the available attachments include the No. 9S and No. 9A Bulldozers, push cup, front and rear cable controls.

Although the tractor is big, general appearance will conform to the other five models of Cat crawlers. Length is 17'10"; width, 9'11"; height (excluding exhaust pipe and air cleaner), 8'9". Ground clearance is 21".

Ninety-inch gauge will be standard as will a seven-roller track frame and fixed drawbar. A console-type panel, seat design and location and careful arrangement of operating controls make a flat, relatively open



deck.

There is a six-volt electric starter for the two-cylinder starting engine. The diesel engine, which delivers 286 HP at 1200 RPM for both the torque converter and direct drive models, shows considerable attention to external appearance. Oil lines, fuel lines and water tubes are placed internally as much as possible.

Several features of the engine include (1) short valve push rods which are possible because the camshaft is high in the block, (2) stationary oil jets provide a continuous stream of oil to cool the pistons, the camshaft and followers, (3) steel-backed aluminum bearing with the lower half of the center main bearing to take the camshaft thrust on a flange-type bearing.

All accessories are driven from a gear at the rear of the crankshaft to avoid much torsional vibration. There is constant power drive for rear-mounted equipment, such as cable controls, providing power regardless of whether the flywheel clutch is engaged or when the torque converter is operating at lowest speeds.

Pressure lubrication and full flow filtration are provided in the engine, the transmission, steering clutch release booster and each final drive. Pressure lubrication is provided also for the oil clutch and starting engine.

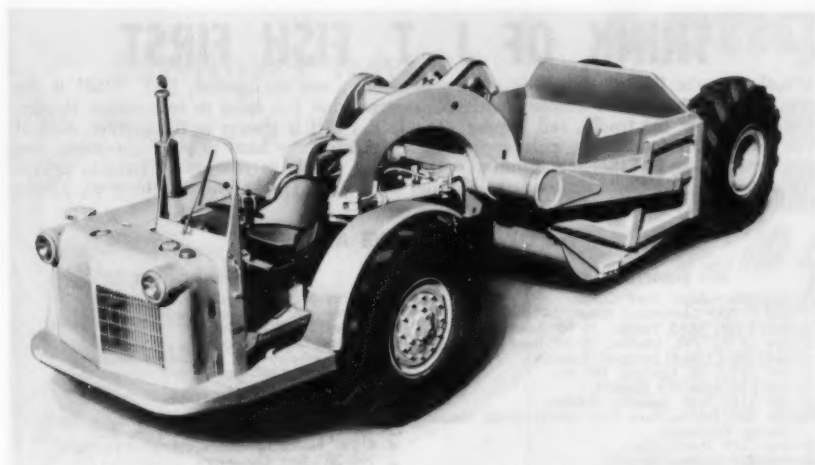
The torque converter is a three-stage, 5:1 torque multiplication unit using diesel fuel for the hydraulic fluid. The flywheel clutch used with

the torque converter is a 19-inch single plate, dry-type. Torque converter fluid cooling is provided by a water-type heat exchanger mounted on the right hand side of the engine. Speeds up to 7.8 MPH with three speeds forward and two in reverse are provided. The direct drive has six speeds forward and six in reverse ranging from 1.6 to 6.8 MPH. With the direct drive transmission, drawbar pounds pull of 60,860 pounds are possible with adequate weight and traction.

A new detailed and informative catalog WDS-155, covering the entire line of single deck walking dragline machines, has been prepared by the Page Engineering Company, Clearing Post Office, Chicago 38, Illinois and is available free upon request.

This colorful, 16-page catalog, is devoted exclusively to draglines ranging in size from 5 to 15 cubic yard capacity, and stresses fast, economical operation. Each working mechanism, its function, features and capabilities are discussed in detail. Specifications are given for each model, and cover boom length, bucket capacity, maximum load capacity, hoist line speed, engine bore, stroke, horsepower and working weight.

In addition, this catalog contains many application photographs showing dragline operations. One section is devoted entirely to the ease and the convenience of maintenance and working space which has been provided by special engineering efforts and incorporated into the design of the machine.



blade arrangement for any type material and gives longer blade life. For example, a straight edge is usually best for land leveling and fine grading, while a drop center arrangement with maximum overhang of the two center sections gives the best loading action in hard materials.

Design for the S-7 provides excel-

A new and improved model of its M-8A heavy-duty rotary drill, is announced by Davey Compressor Co., Kent, Ohio.

Designed for mounting on any standard truck, the unit utilizes both compressed air and high pressure water for drilling. It has a rated capacity of 6½-inch holes up to 300 ft. with air and 1,000 ft. with mud. In operation, it is said to make possible substantial reductions in drilling costs.

Compressor for "air blast" drilling is a Davey 500 c.f.m. unit. The high pressure water pump is of heavy duty duplex type.

lent accessibility of all major components for servicing. Engine, clutch, transmission, drive axle, hydraulic system, etc. are all easy to get at and repair without major disassembly.

Catalog literature and complete specifications of the S-7 Scraper are available from any Euclid dealer or direct from Euclid Division at Cleveland 17, Ohio.

Compressor and pump are driven by a GMC-471 engine mounted on the truck bed. This employs a 5-speed transmission for different drilling rates.

The new Model M-8A is recommended for water well drilling, core drilling, structure testing and shot and blast holes. Its 30 ft. mast has a fabricated steel crown block assembly with two 20-inch diameter roller bearing sheaves. Unit is designed for pulling 15-ft. drill section stems.

Weight of the complete unit, as illustrated, is approximately 20,000 lbs.



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Item 455-WV143 Caterpillar Model D7 Tractor mounted with LaPlant Choate Angledozer and LeTourneau Double Drum Cable Control. Installed new master clutch brake. Rebuilt steering control lever. Machine is in good running condition. F.O.B. Clarksburg, W. Va. "BUY AND TRY" \$3500.00

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Item 854-P255 471 General Motors Diesel Engine, Model 4030A, Two-cycle, 4½x5 equipped with 70mm. injector. Including radiator, Woodward governor, 12V electric starting and charging generator, tachometer, base and Rockford clutch (clutch model PTA-1124). Push button starting—starting battery not included. New pistons, liners, connecting rod bearing, wrist pin bushings and pins in rods and pistons, new water pump, and rebuilt 70 mm. injector were installed. Also new filters. F.O.B. Pittsburgh, Pa. "AS IS" \$1750.00

Item 954-C161 Allis-Chalmers HD14 Tractor w/Baker Hyd. Blade. In running condition. F.O.B. Clearfield, Pa. "AS IS WHERE IS" \$2200.00

Item 355-C201 International TD18 Tractor mounted with Bucyrus-Erie Straight Blade. F.O.B. Clearfield, Pa. "AS IS WHERE IS" \$3500.00

Item 255-E154 Lorain Shovel. Model T1-20, equipped with D315 Cat. Engine. In very good condition. F.O.B. Erie, Pa. \$9000.00

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3-Jeffrey 29C—Cutting machines on Cuts.

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- 3-Jeffrey, 15 ton, type MH-110, 250 volt, 42", 44" and 48" Ga.
- 3-Jeffrey, 10 ton, type MH-78, 42" and 44" Ga.
- 3-Jeffrey, 8 ton, type MH-100, 42" and 44" Ga.
- 12-Jeffrey, 6 ton, type MH-88, 42", 44" and 48" Ga.
- 2-Jeffrey, 4 ton, type MH-96, 42" and 48" Ga.
- 3-G.E., 4 ton, type 825 Locomotives.
- 10-G.E., 6ton, type 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
- 1-G.E., 8 ton, type 822, Locomotive, 44" Ga.
- 3-G.E., 10 ton, type 809, Locomotives, 42", 44" and 48" Ga.
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- 2-Goodman, 8 ton type 32A, 44" and 48" Ga.
- 1-Goodman, 10 ton, type 34B, 48" Ga.
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- 1-Goodman, 15 ton, type 36B, 44" Ga.
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- 6-Gasoline and Diesel Locomotives, 4 to 20 tons.

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- 1-Allis Chalmers 200 KVA, AC (Natural Gas).
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- 1-200 KW, G.E. HCC-6 Rotary.
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COAL MINING

JUNE, 1955

Allis-Chalmers—Tractor Division	2-3
Agency—Bert S. Gittins	
Beckwith Machinery Company	
Insert between pages 4 and 5, 19 and 2nd Cover	
Agency—Hosler Advertising Agency	
Caterpillar Tractor Co.	Insert between 2-3
Agency—Thompson Adv. Inc.	
Cleveland Rock Drill Division	Inside Spread
Agency—Hoffman and York Inc.	
J. T. Fish Company	20
Foster Company, L. B.	20
Agency—Lando Advertising Agency	
Greensburg Machine Company	20
Highway Equipment Company	Front and Back Covers
Agency—Palm & Patterson, Inc.	
Jeffrey Mfg. Company	16
Agency—Byer & Bowman	
Licking View Tool & Machine Company	5
Lusk Co., Harold C.	5
Meyer Brothers	20
Mine Safety Appliances Co.	Front Inside Cover
Agency—Ketchum, MacLeod and Grove	
Moore-Flesher Hauling Company	5
Ohio Machinery Co.	Insert between pages 4 and 5
Agency—Hosler Advertising, Inc.	
Salem Tool Company, The	5
Agency—Meek & Thomas, Inc.	
Schroeder Brothers	4
Agency—McHenry-Derek	
Scottdale Machine, Foundry and Construction	4
Agency—McHenry-Derek	
T. L. (Les) Simpson	20
Suncrest Nurseries	20
G. W. Vickroy	20
Walker Machinery Co.	Insert between pages 4 and 5
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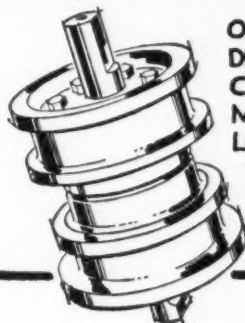
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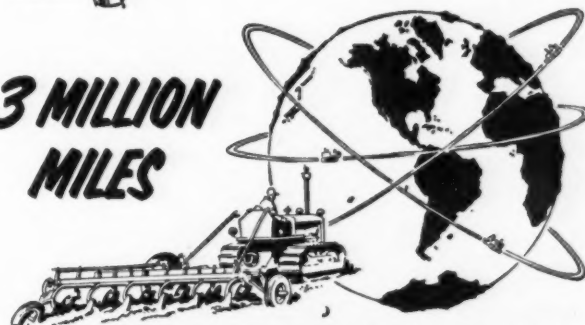


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